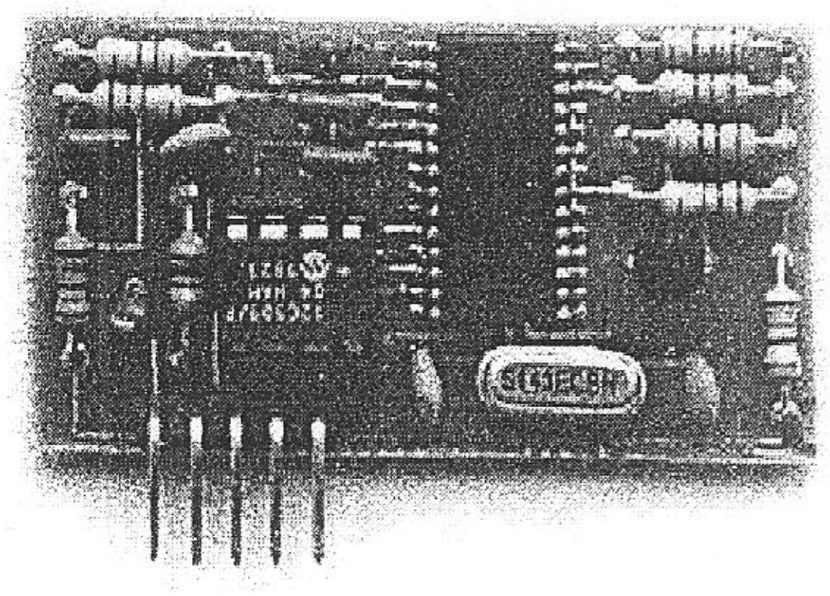
ITU Technologies

TVOSD™

SERIAL TV ON-SCREEN TEXT DISPLAY MODULE WITH OVERLAY & FULL SCREEN MODES



FEATURES:

- Accepts RS-232 Serial Data
- 11 Rows by 28 Characters
- Easy to Use Command Codes
- Uses Standard ASCII Data for Display
- Full Screen Mode Features 8 Colors
- Define Screen Background, Character Border and Character Background Colors
- Video-In Input for Overlay Mode
- Blinks Text at Two Speed Rates
- Easy 5 pin interface - +5V, Ground, Video In, Video Out, and Serial In.
- Vertical and Horizontal Zoom Modes
- Easily Position Text on Screen
- Small 2" x 1" x 0.4" package
- Works with the Parallax BASIC Stamp Computer (SEROUT instruction)
- Perfect for use with Microcontrollers or Single-Board Computers

APPLICATIONS:

- Process and Control Monitors
- Home Automation Display
- Robotics
- Electronic Signs
- CCTV Security
- Replacement for LCD's

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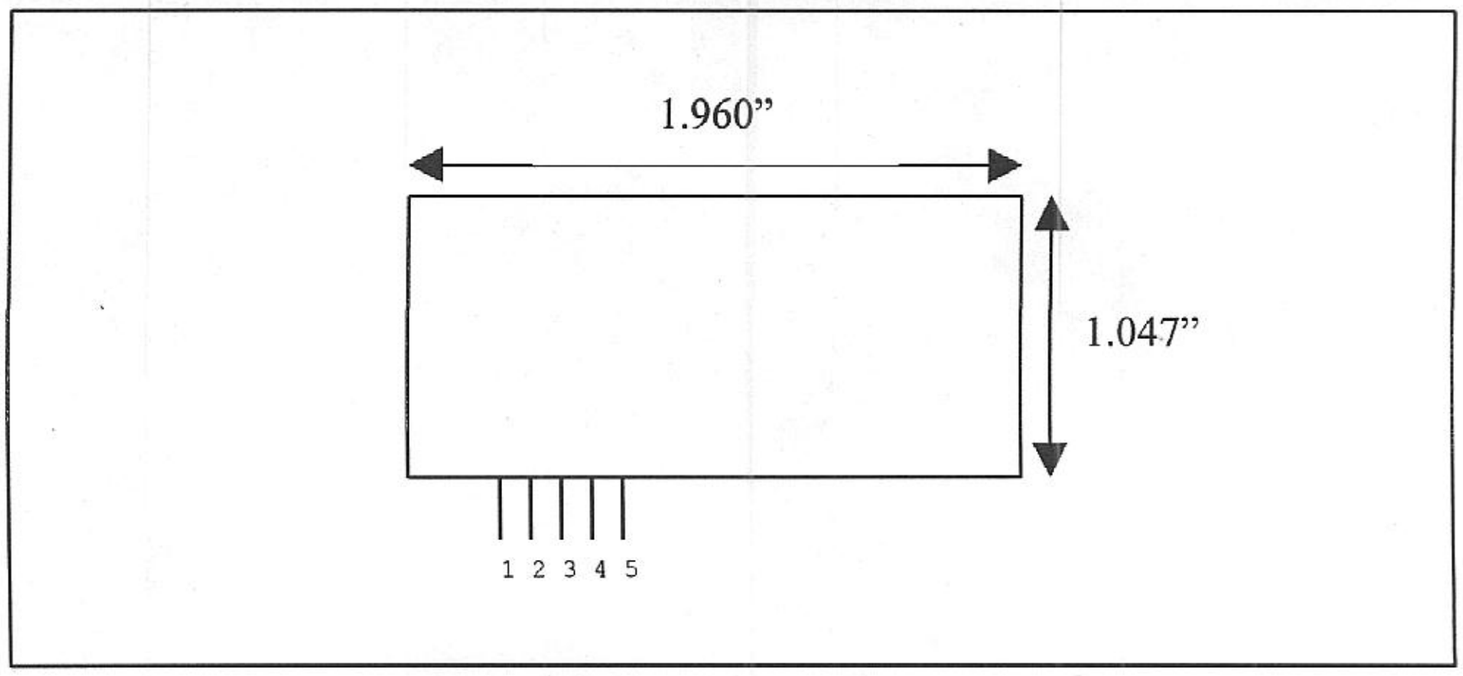

TVOSD™ 5 PIN SIP MODULE

PIN DESCRIPTION

PIN NUMBER	PIN NAME	DESCRIPTION
1	V_{DD}	+5V Supply Input
2	VID_{IN}	Composite Video Input – 75 ohm terminated
3	VID_{OUT}	NTSC Composite Video Output
4	SER_{IN}	Serial Data Input – 1200 Baud N-8-1 RS-232
5	GND	Ground

GENERAL DESCRIPTION

The ITU TVOSD™ is a small SIP module (approximately 2” x 1” x 0.4”) designed for use as an On-Screen Text Display (OSD) for video. The module provides an easy to use serial interface for one-wire interfacing to microcontrollers and single board computers. A page may consist of 11 rows by 28 characters with a 128 character set containing letters, numbers, foreign letters, and other practical characters. Eight Colors can be used in the Full Screen Mode to define the character text, character border, character background or screen background. The module can also accept video input to overlay text on incoming video. Text can be sent as plain ASCII data, while single byte command codes provide an easy method of setting up video attributes.

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COMMAND CODES

Command codes are single byte commands (sometimes followed by byte-wide parameters) that are used to perform functions of the On-Screen Display. They are listed below:

Code	Parameters (all BYTE values)		Function
130	<ROW>	<CHAR>	Set POINTER on screen <ROW>: Row (0-10) <CHAR>: Character (0-27)
131	<COLOR>		Set COLOR attribute for characters <COLOR>: 0 – Black 1 – Blue 2 – Green 3 – Cyan 4 – Red 5 – Magenta 6 – Yellow 7 – white
132			ENABLE BLINK attribute for characters
133			DISABLE BLINK attribute for characters
134			ENABLE BACKGROUND attribute for characters
135			DISABLE BACKGROUND attribute for characters
140	<ROW>	<VPOS OFFSET>	VERTICAL POSITION OFFSET <ROW>: Row (0-10) <VPOS OFFSET>: bit values "XXsb bbbb" bit 7 & 6 'X' = don't care (0 or 1) bit 5 's' = sign bit (0 – positive, 1- negative) bits 0-4 'b bbbb' = offset (0-17) if the offset is positive, then the corresponding number of lines are added on top of the row (moving the row downward), If negative, the rows are subtracted.
141	<ROW>	<HPOS OFFSET>	HORIZONTAL POSITION OFFSET <ROW>: Row (0-10) <HPOS OFFSET>: The row is shifted to the right by the corresponding number of pixels (0-15)
142	<ROW>		ENABLE BORDERS for characters on this row. <ROW>: Row (0-10)
143	<ROW>		DISABLE BORDERS for characters on this row. <ROW>: Row (0-10)

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144	<ROW>	ENABLE CHARACTERS displayed for this row. <ROW>: Row (0-10)
145	<ROW>	DISABLE CHARACTERS displayed for this row. <ROW>: Row (0-10)
150	<HZT>	HORIZONTAL ZOOM – TOP <HZT> - Horizontal Zoom factor for row 0 0 – 1 pixel per character dot 1 – 2 pixels per character dot 2 – 3 pixels per character dot 3 – 4 pixels per character dot
151	<VZT>	VERTICAL ZOOM – TOP <VZT> - Vertical Zoom factor for row 0 0 – 1 pixel per character line 1 – 2 pixels per character line 2 – 3 pixels per character line 3 – 4 pixels per character line
152	<HZM>	HORIZONTAL ZOOM – MIDDLE <HZM> - Horizontal Zoom factor for rows 1-9 (see HZT above for values)
153	<VZM>	VERTICAL ZOOM – MIDDLE <VZM> - Vertical Zoom factor for rows 1-9 (see VZT above for values)
154	<HZB>	HORIZONTAL ZOOM – BOTTOM <HZB> - Horizontal Zoom factor for row 10 (see HZT above for values)
155	<VZB>	VERTICAL ZOOM – BOTTOM <VZB> - Vertical Zoom factor for row 10 (see VZT above for values)
160	<COLOR>	Set SCREEN BACKGROUND COLOR <COLOR>: 0 – Black 1 – Blue 2 – Green 3 – Cyan 4 – Red 5 – Magenta 6 – Yellow 7 – white
161	<COLOR>	Set character BORDER COLOR <COLOR>: (as above)
162	<COLOR>	Set CHARACTER BACKGROUND COLOR <COLOR>: (as above)

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170	OVERLAY MODE - Overlay text on Video In signal
171	FULL SCREEN MODE - Generate Full screen output; ignores Video In
172	Not Available
173	ENABLE DISPLAY
174	DISABLE DISPLAY
175	Not Available
176	Set BLINK PERIOD to 0.5s
177	Not Available
190	CLEAR SCREEN - A 2ms pause is required after this command before new commands can be processed

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SERIAL INTERFACE

The ITU TVOSD™ is designed to be interfaced easily to a microcontroller, PC or Single Board Computer. Pin 4 of the SIP module is used for Serial Data Input. The unit accepts RS-232 data with the following parameters: 1200 Baud, 8 data bits, no parity, and one stop bit. We recommend the use of a 22K ohm resistor inline with pin 4 of the module when used with a PC or other RS-232 device. A microcontroller or other 5V logic device can be used by sending the serial data inverted. No resistor is needed in this case.

INTERFACING EXAMPLES

Below are examples of interfacing the ITU TVOSD™ with the Parallax BASIC Stamp Computer.

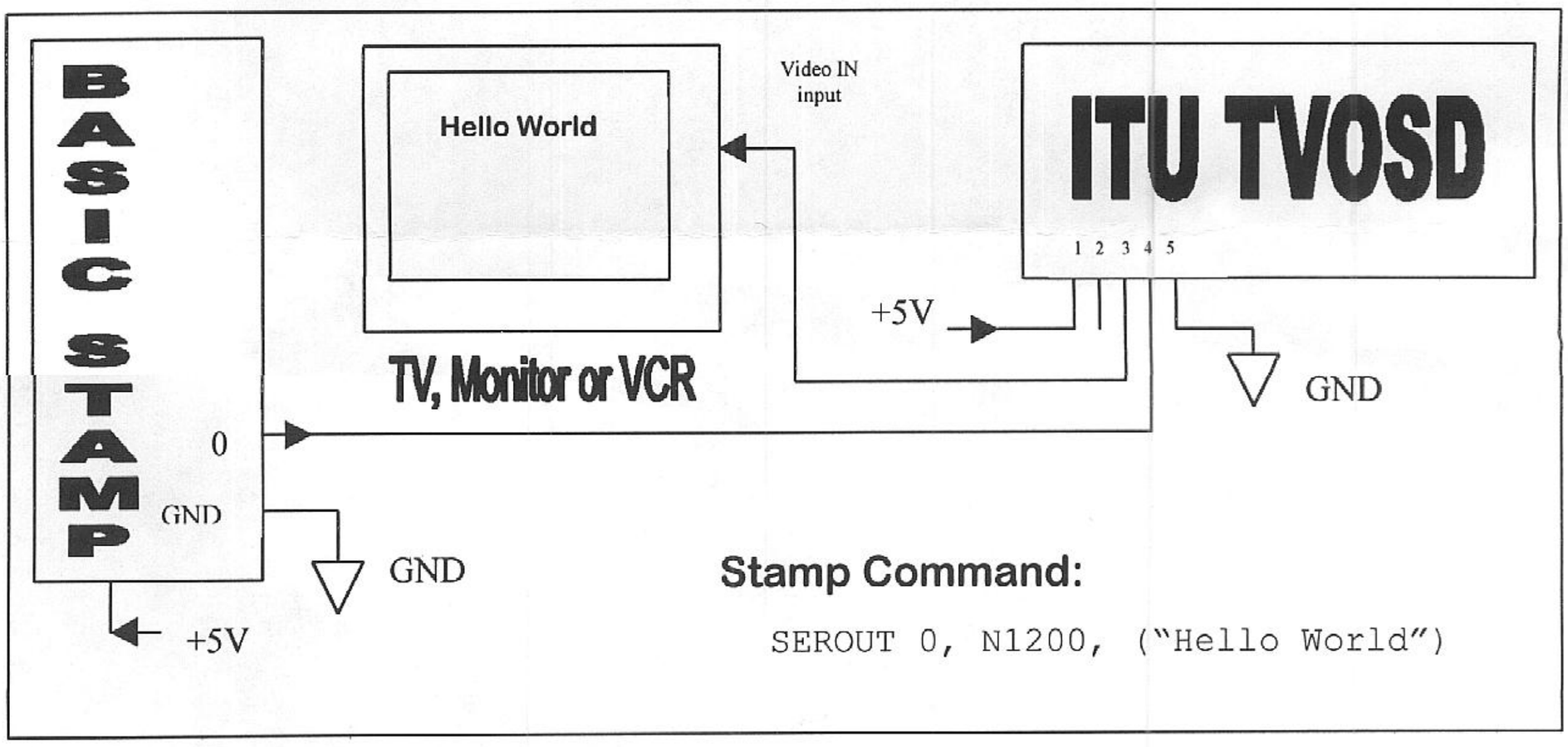

FIG. 1 – Simple example of interfacing the ITU TVOSD™ with the Parallax BASIC Stamp Computer.

EXAMPLE 1

Figure 1 shows an example of interfacing the ITU TVOSD™ module with the Parallax BASIC Stamp Computer. Simply one I/O line of the BASIC Stamp is connected to the SER_{IN} line of the module. A TV or composite monitor is used as the display and connected to the VID_{OUT} line. Only one BASIC Stamp command is needed to produce the display of the message "Hello World" on the screen:

```
SEROUT 0, N1200, ("Hello World")
```

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EXAMPLE 2

Using the same hardware setup as Example 1, a more complex program using the BASIC Stamp is shown that demonstrates the use of color, positioning, zooming, borders, blinking and backgrounds is shown below:

```
' Full screen example using the BASIC Stamp and ITU TVOSD
' shows use of zoom, color, setting borders, blinking and
' char background
SEROUT 0, N1200, (160,1)        ' Blue background
SEROUT 0, N1200, (150,1)        ' zoom top hz level 1
SEROUT 0, N1200, (151,1)        ' zoom top vt level 1
SEROUT 0, N1200, (171)          ' set full screen mode
SEROUT 0, N1200, (174)          ' disable display
SEROUT 0, N1200, (162,5)        ' Magenta char background
SEROUT 0, N1200, (176)          ' set blink to fast
SEROUT 0, N1200, (142,4)        ' set borders for row 4
SEROUT 0, N1200, (161,4)        ' red border
SEROUT 0, N1200, (190)          ' clear screen
PAUSE 5
SEROUT 0, N1200, (131, 6)       ' Yellow text
SEROUT 0, N1200, ("Hello")
SEROUT 0, N1200, (130,2,5)      ' row 2, col 5
SEROUT 0, N1200, (131,2)        ' Green Text
SEROUT 0, N1200, (132)          ' blink on
SEROUT 0, N1200, ("Look here")
SEROUT 0, N1200, (133)          ' blink off
SEROUT 0, N1200, (130,4,10)     ' row 4, col 10
SEROUT 0, N1200, ("Borders")
SEROUT 0, N1200, (131, 4)       ' Red Text
SEROUT 0, N1200, (130,6,15)     ' row 6, col 15
SEROUT 0, N1200, ("ATTENTION")
SEROUT 0, N1200, (131,7)        ' white text
SEROUT 0, N1200, (130,8,1)      ' row 8, col 1
SEROUT 0, N1200, (134)          ' enable background
SEROUT 0, N1200, ("ITU Technologies TV OSD")
SEROUT 0, N1200, (135)          ' disable background
SEROUT 0, N1200, (130,9,2)      ' row 9,0
SEROUT 0, N1200, ("Overlay Text on Video")
SEROUT 0, N1200, (173)
```

It should also be noted that this program keeps the display off until all data is written, thus the display appears to be updated immediately.

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EXAMPLE 3

One of the most useful modes of the ITU TVOSD™ is the overlay mode. Overlay mode allows the module to overlay text on an incoming signal present on the VID_{IN} pin. To alter the "Hello World" demo of example 1 for overlay mode, simply connect pin 2 (VID_{IN}) of the module to a video signal source such as the Video Out jack of a VCR. The program below is used:

```
SEROUT 0, N1200, (170)
SEROUT 0, N1200, ("Hello World")
```

PROGRAMMING NOTES

When issuing commands to the ITU TVOSD™ module, some rules should be followed. Commands that affect the screen attributes should be issued before data is displayed. Certain command sequences may create unpredictable or unexpected results. Experimentation may be needed to verify functionality with your programs.

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WORLDWIDE SALES

ITU Technologies' products are available through:

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Technical support is available through ITU Technologies. The preferred method of support is via e-mail.

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